

Chapter 1 - Hazard Analysis

1.0 Introduction

This document identifies and consolidates existing user safety and health requirements and resolves contradictions found in DOE and Federal¹ chemical-related safety and health regulations and National Standards that address hazard analysis of activities involving **chemicals** (see def.) and **chemical products** (see def.). It specifically consolidates requirements found in the National Fire Protection Association (NFPA), the American National Standards Institute (ANSI), the Compressed Gas Association (CGA), the Occupational Safety and Health Administration (OSHA), and certain Environmental Protection Agency (EPA) regulations and Department of Energy (DOE) Rules and Orders. This also includes technical standards that are made mandatory by their specific reference within a regulation, rule or DOE Order.

This document is intended only to consolidate existing chemical-related safety and health requirements that overlap or are duplicative and to eliminate or resolve any inconsistencies or contradictions among those requirements. This document does NOT create any new or additional requirements. The listing of consolidated requirements that follows includes “pointers” to the sources of those requirements, permitting the user to track what the requirements are and where each comes from.

2.0 Applicability

This document applies to all locations that use chemicals or chemical products. *[NOTE: Throughout this document, the term “chemicals” is used to indicate chemicals and/or chemical products as described in Section 3, below.]* This document is intended only to address safety-related hazard and risk analysis requirements applicable to chemical user activities.

3.0 Definitions and Acronyms

Approval: Authorization from subject matter experts or the appropriate level of management as defined in local site or facility procedures.

Chemical: Any element, compound or mixture of elements and/or compounds. A substance that a) possesses hazardous properties (including, but not limited to flammability, toxicity, corrosivity, reactivity); b) is included on any federal, state, or local agency list of regulated chemicals; or c) is associated with Material Safety Data Sheets (MSDS). For the purpose of this document this definition also applies to **chemical products** (see def.)

Chemical Product: A mixture of any combination of two or more chemicals (see def.) that may or may not be the result, in whole or in part, of a chemical reaction, and that itself has hazardous properties. Chemical products include materials such as paints, lubricants, cleaning agents, fuels, etc. and will have MSDSs associated with them.

Fire area: An area in a building that is separated from the rest of the building by a one- hour fire barrier. All penetrations through this fire barrier must be constructed to maintain the one-hour fire resistance.

¹ State and local codes are not included in this chapter, since they vary by state and locality.

CONSOLIDATED CHEMICAL USER SAFETY & HEALTH REQUIREMENTS

Hazard Analysis: The determination of material, system, process, and plant characteristics that can produce undesirable consequences, followed by the assessment of hazardous situations associated with a process or activity. Largely qualitative techniques are used to pinpoint weaknesses in design or operation of the facility that could lead to accidents.

Hazardous Operations: Includes process operations that are subject to regulatory actions because of the presence of one or more specific hazardous materials or types of materials that meet or exceed established thresholds or guidelines. These include operations with chemicals governed by:

- 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals" or 40 CFR 68.67, "Chemical Accident Prevention Provisions-Process Hazards Analysis;"
- Hazard category 1, 2, or 3 nuclear operations as defined in 10 CFR 830, "Nuclear Safety Management;"
- Operations with Beryllium as defined by 10 CFR 850;
- Facilities with "significant" fire hazards as defined by DOE O 420.1A;
- Hazardous waste operations as defined in 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response;" and
- Activities subject to NEPA environmental assessment or environmental impact statements as defined in 10 CFR 1021.400.

MSDS: Material Safety Data Sheet

NFPA: National Fire Protection Association

PHA: Process Hazard Analysis as defined in 29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals"

System: Piping, pumps and/or containers that are attached together so that the collection can perform some specific function.

CONSOLIDATED CHEMICAL USER SAFETY & HEALTH REQUIREMENTS

4.0 Requirements

Sources ²	Consolidated Requirements
	4.1 General (Applicable to all operations/activities involving chemicals)
ANSI Z49.1, 3.2.2.2; CGA P-1, 4.1; DOE O 440.1A , 4 (i) NFPA 30, 5-2 NFPA 45, 7-1; NFPA 45, 7.2-11, NFPA 430, 2-1.1; NFPA 432, 2-7.1; 29CFR1910.106 , (e)(8); 29CFR1910.146 , (c)(1)-(d)(2); 29CFR1910.1450 , (e)(3); 48 CFR 970.5204-2 (c)(2) ³ 10CFR835.204, (d)(2)	4.1.1 Hazards associated with all activities involving chemicals that could put the employee at risk of injury or illness shall be evaluated. Those activities include, but are not limited to a) design of new facilities or modification of existing facilities and equipment, b) operations and procedures and c) equipment, products and services that are selected or purchased.
DOE 440.1A , Attachment 1 (1)(b)(2)(d) and Attachment 2 (14)(a)(4) NFPA 430, 2-1.1 NFPA 430, 2-10.1 NFPA 432, 2-7.1 29 CFR 1910.132 (d)(2)	4.1.1.1 The results of the hazard analysis shall be documented and approved by the appropriate safety official or manager.
ANSI Z49.1, 3.2.1.2; ANSI Z49.1, 3.2.1.3; ANSI Z49.1, 3.2.1.5; CGA P-1, 4.1; NFPA 45, 7-1; NFPA 432, 2-2; NFPA 430, 2-7.1; 29CFR1910.1200 (h)(1) 29CFR1926.21 (b)(2); 29CFR1910.1450 (f)(1) and (f)(4)(i)(B) and (f)(4)(i)(C)	4.1.2 Before they begin work, employees shall be informed of the hazards present in their work area.
	4.2 Hazardous Operations⁴ (see definition)
29CFR1910.119 , (e) 29CFR1910.120 (c)(1)	4.2.1 Hazardous processes shall be analyzed for possible natural and man-made events that could lead to or result in a loss of control of

² Hyperlinks to ANSI, CGA, and NFPA requirements provided here are for general information only, as they require user subscription to a prescribed service in order to access these organizations' source requirements.

³ This requirement of the DOE Acquisition Regulations (DEAR, ES&H Clause) requires an identification and evaluation of hazards associated with work, as part of an overall documented safety management system.

⁴ The requirements for hazardous operations are in addition to requirements associated with those activities specified in Section 4.1.

CONSOLIDATED CHEMICAL USER SAFETY & HEALTH REQUIREMENTS

Sources ²	Consolidated Requirements
40CFR68.50 40CFR68.67 , (a) 40CFR1502.14 10CFR830 , Subpart B 10CFR850.21 , (a) 10CFR1021.400 DOE O 151.1A , Attachment, Chap. IV, 3 (a) (1) DOE O 420.1A , 4.2.1 (5)	hazardous materials
29CFR1910.119 , (e)(2) 40CFR68.67 , (b) 40CFR1502.24 10CFR830.7 10CFR830 Subpart B, Part 204, (a) and (b) DOE-STD-1120-98 DOE-STD-3009-94 DOE-STD-3011-94 DOE-STD-3016-99 DOE O460.1A	4.2.1.1 Hazard analysis techniques shall be selected and used that are appropriate for the hazards and complexities of work processes being analyzed
29CFR1910.119 , (d) 29CFR1910.120 (c)(3) 10CFR830 Subpart B, Part202, (b)(3) DOE-STD-1027-92 40CFR1502.15 40CFR68.65	4.2.1.2 Process information relevant to the hazard analysis, such as energy sources and hazardous materials, shall be identified
29CFR1910.119 , (e)(3) 29CFR1910.120 , (c)(7) 40CFR68.22 40CFR68.25 40CFR68.28 40CFR68.67 , (c) 40CFR1502.16 40CFR1508.8 10CFR830.204 (b)(3) DOE Order 5480.23 , 8(c)(3)	4.2.1.3 Consequences of postulated accidents associated with hazardous processes and their likelihood of occurrence shall be evaluated
29CFR1910.119 , (e)(4) 40CFR68.67 , (d) 10CFR850.21 , (b)	4.2.1.4 Hazard analyses shall be performed by qualified personnel

CONSOLIDATED CHEMICAL USER SAFETY & HEALTH REQUIREMENTS

Sources ²	Consolidated Requirements
29CFR1910.119 , (e)(5) 29CFR1910.120 , (b)(4) 40CFR68.67 , (e) 40CFR68.39 40CFR1508.10 10CFR1021.310 10CFR1021.310 10CFR830 Subpart B, Part 204, (a) & (b)	4.2.1.5 Results of hazard analyses shall be documented and approved by appropriate management
29CFR1910.119 , (e)(6) 40CFR68.67 , (f) 10CFR830 Subpart B, Part 204, (c)(1), (c)(2)	4.2.1.6 Hazard analyses shall be updated and revalidated periodically
29CFR1910.119 , (e)(7) 40CFR68.67 , (g) 10CFR830.6	4.2.1.7 Hazard analysis results and documentation, including updates, shall be retained for the life of the process operation

Appendix A

Source Documents

ANSI Z49.1, (1994), "Safety in Welding, Cutting, and Allied processes"

CGA P-1, (1991), "Safe Handling of Compressed Gases in Containers"

DOE O 151.1, "Comprehensive Emergency Management System"

DOE O 420.1A, "Facility Safety"

DOE O 440.1A, "Worker Protection Management"

NFPA 30, (1996), "Flammable and Combustible Liquids Code."

DOE O 460.1A, "Packaging and Transportation Safety"

DOE-STD-1027-92, "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports"

DOE-STD-1120-98, "Integration of Environment, Safety, and Health into Facility Disposition Activities"

DOE-STD-3009-94, "Preparation Guide for U.S. DOE Nonreactor Nuclear Facility Safety Analysis Reports"

DOE-STD-3011-94, "Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans"

DOE-STD-3016-99, "Limited Standard; Hazard Analysis Reports for Nuclear Explosive Operations"

NFPA 45, (1996), "Standard on Fire Protection for Laboratories Using Chemicals."

NFPA 430, (1996), "Storage of Liquid and Solid Oxidizers"

NFPA 432, (1997), "Storage of Organic Peroxides Formulation"

10 CFR 830, "Nuclear Safety Management," Subpart B, "Safety Basis Requirements"

10 CFR 835, "Occupational Radiation Protection"

10 CFR 850, "Chronic Beryllium Disease Prevention Program"

10 CFR 1021, "National Environmental Policy Act Implementing Procedures"

29 CFR 1910.106, "Flammable and Combustible Liquids"

29 CFR 1910.119, "Process Safety Management of Highly Hazardous Chemicals"

CONSOLIDATED CHEMICAL USER SAFETY & HEALTH REQUIREMENTS

- 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response"
- 29 CFR 1910.132, "Personal protective Equipment"
- 29 CFR 1910.146, "Permit-required Confined Spaces"
- 29 CFR 1910.1200, "Hazard Communication."
- 29 CFR 1926.21, "Safety Training and Education"
- 29 CFR 1910.1450, "Occupational Exposure to Hazardous Chemicals in Laboratories"
- 40 CFR 68, "Chemical Accident Prevention Provisions"
- 40 CFR Parts 1500-1508, "Chapter V-Council on Environmental Quality"
- 48 CFR 970, "DOE Management and Operating Contracts"